

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Inventor: Hyungsoo Choi

Application No.: 10/664,431

Filed: September 19, 2003

NANOSTRUCTURES INCLUDING A METAL

)
)
)
)
)
)
)

Before the Examiner

Kelly M. Stouffer

Group Art Unit 1762

PATENT COUNSEL DECLARATION UNDER 37 CFR § 1.131

I, patent counsel of record for the above-identified patent application (the "Subject Application"), hereby declare as follows:

1. I have been the primary attorney responsible for the preparation, filing, and prosecution of the Subject Application, and have practiced law in Indianapolis, Indiana since 1994.
2. Based on our written records, on June 18, 2003, I forwarded an initial draft of the Subject Application to the inventor for review. A copy of the accompanying cover letter is provided in Exhibit A.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope on September 26, 2007, addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature: _____

Printed Name: _____ L. Scott Paynter

Patent Counsel Declaration Under 37 CFR 1.131

Inventors: Choi

Application No.: 10/664,431

Filed: September 19, 2003

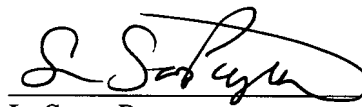
Page 1 of 3

3. On or about July 1, 2003, I left for the High Adventure Boy Scout Camp, Philmont Ranch, in Cimmaron, New Mexico, as an adult leader accompanying about 12 Boy Scouts. From this time until no sooner than July 15, 2003, I was out of the office, and thus not available for the discussion of comments related to the Subject Application. A copy of information corroborating this trip is provided in Exhibit B.
4. On or about July 28, 2003, I communicated with the inventor offering my availability for a teleconference meeting. A copy of an e-mail corroborating this communication is enclosed in Exhibit C hereto.
5. In addition to my service as an adult leader for the trip in July, I had scheduled a vacation in Quetico Provincial Park, canoeing with my son from August 1, 2003 through August 11, 2003. Because we drove to the Park (approximately a 16 hour trip one way), we did not actually enter the park until August 3, 2003, with the remaining days (August 1st, 2nd, and 11th) being travel days. Accordingly, I indicated my availability in the e-mail of Exhibit C on August 1st, 2nd, and then not again until August 12th.
6. During our trip in the Park, I received word that my wife, eight months pregnant with our 5th child, had gone into early labor. Accordingly, we left the Park early to return to my home in Indianapolis, Indiana.
7. Because my wife had been hospitalized for several days due to this event, upon returning from the trip I stayed home through much of the time period up to August 27, 2003 to care for my 2 year old daughter, 11 year old daughter, 14 year old son, and further to arrange the move of my 18 year old daughter to college. Based on information and belief, just as I was again available to assist with the review of the Subject Application, the inventor, a professor, was involved with

work-related duties to prepare for the upcoming academic school year at the University of Illinois. The subsequent birth of my fifth child is corroborated by a copy of her birth certificate with redactions, as provided in Exhibit D hereto.

8. Based on information and belief, a conference call was scheduled and conducted on September 9, 2003.
9. Subsequently, a revised draft was sent on September 12, 2003 for review and further comments were incorporated and the resulting final version was submitted with signature papers on or about September 16, 2003.
10. Subsequently, the executed papers were received on September 19, 2003 (see accompanying letter of Exhibit E), and the Subject Application was filed the same day.
11. The undersigned, being hereby warned that willful false statements and the like are punishable by a fine or imprisonment, or both (18 USC §1001), and may jeopardize the validity of the application or any patent issuing thereon, declares that all statements made of her own knowledge are true and that all statements made on information and belief are believed to be true.

Date: 26 September 2007



L. Scott Paynter

KD_IM-1109876_1.DOC

WOODARD, EMHARDT, MORIARTY, McNETT & HENRY LLP

C. DAVID EMHARDT
JACK V. MORIARTY
JOHN C. MCNETT
THOMAS O. HENRY
JAMES M. DURLACHER
CHARLES R. REEVES
VINCENT O. WAGNER
STEVE ZLATOS
SPIRO BEREVESKOS
CLIFFORD W. BROWNING
R. RANDALL FRISK
DANIEL J. LUEDERS

KENNETH A. GANDY
TIMOTHY N. THOMAS
KURT N. JONES
JOHN H. ALLIE
HOLIDAY W. BANTA
TROY J. COLE
L. SCOTT PAYNTER
CHARLES J. MEYER
MATTHEW R. SCHANTZ
GREGORY B. COY
LISA A. HIDAY
JOHN V. DANILUCK

PATENT AND TRADEMARK ATTORNEYS
BANK ONE CENTER/TOWER
111 MONUMENT CIRCLE, SUITE 3700
INDIANAPOLIS, INDIANA 46204-5137
(317) 634-3456
FAX (317) 637-7561
www.uspatent.com

CHRISTOPHER A. BROWN
ARTHUR J. USHER IV
DOUGLAS A. COLLIER
BRAD A. SCHEPERS
JAMES B. MYERS, JR.
JOHN M. BRADSHAW
QUENTIN G. CANTRELL
CHARLES P. SCHMAL
DAVID E. NOVAK
JOHN L. ROBERTS
DENISE M. GOSNELL
JOHN J. EMANUELE
MICHAEL S. WHERRY

JOSEPH A. NAUGHTON
SENIOR COUNSEL

SCOTT J. STEVENS
EDWARD E. SOWERS
OF COUNSEL

CHARLES P. JACOBS
(1937-1992)
VIRGIL H. LOCKWOOD
(1900-1932)
RALPH G. LOCKWOOD
(1890-1957)
HAROLD R. WOODARD
(1911-2003)

June 18, 2003

Hyungsoo Choi
Department of Electrical and Computer Engineering
University of Illinois
155 Everitt Laboratory
1406 West Green Street
Urbana, IL 61801

RE: New Patent Application
Inventor: H. Choi
Title: NANOSTRUCTURES INCLUDING A METAL
Our Ref: 22010-199
Your Ref.: TF02130

Dear Soo:

Please review the attached draft of the patent application for the above-indicated invention disclosure. A few items to consider are outlined below. If any changes should be made, please make them directly on the enclosed copy and return them to us so that we may incorporate your changes into the original to be filed with the U. S. Patent and Trademark Office. Also enclosed are signature papers consisting of: (1) an Assignment and (2) a Declaration and Power of Attorney that should be signed and dated where indicated once the application is approved for filing by you. Once executed, these papers should be returned to us for filing with the application.

Review of the Description and Drawings:

Please review the application for completeness and accuracy. Does the application disclose all the details necessary for any person skilled in the field to be able to make and use the invention? Is the best mode of carrying out the invention adequately described?

Feel free to point out any other details or advantages of which you are aware of that are not described or not adequately described. In particular, what else should be discussed with respect to your new concept? Can any additional alternative design features be included in the application?

Review of the Claims:

Note that each numbered claim appearing after "What is claimed is" on page 18 of the application provides a separate definition of the invention, and hence, each claim will afford a different scope of protection if granted. Some claims are more specific than others. I have sought to cover the invention in its broader aspects and its narrow aspects by drafting a number of claims of varying scope. In general, the more detail a claim has, the more narrow the protection afforded by the claim.

When reading the claims, please ensure that at least the broader claims cover the various ways in which the invention can be practiced. Consider whether any of the independent claims (claims 1, 9, 15, 21, 28, and 35) appear to include any limitations which are unnecessary to the preferred embodiment of the invention. If a claim recites an element not present in a particular variation or embodiment of the invention, that claim will probably not cover that embodiment. If none of the claims cover a particular variation of the invention, please let me know. If so, we will likely need to add further claims.

Inventorship:

It is my present understanding that there is only one inventor of the inventions defined by the claims of the application. We would like to confirm this understanding with an explanation of how inventorship is determined under the patent laws.

The determination of inventorship turns on who conceived of the invention. Inventive "conception" is described as the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice. Thus, the test for conception is whether the inventor had an idea that was definite and permanent enough that one skilled in the art could understand the invention. Conception is generally more than a lofty goal or research plan, but does not require the inventor to know that the invention will work as intended. _____

Generally speaking, there are two circumstances resulting in the naming of multiple inventors. One possibility is that you work jointly with the other inventors as part of a design team with some or all of the other inventors, and that group is jointly responsible for conception of the invention such that any individual contributions are merged into the whole and are not separately identifiable. The other possibility is a specific contribution directed to one or more features of the conceived invention. For example, one inventor may have been asked by one or more of the other inventors to direct their effort to one particular area of the design or one particular component. If this second possibility accurately describes the situation, please indicate the nature of each inventor's contribution to the subject invention. If the first possibility accurately describes the role of one or more inventors, please let me know that as well and we

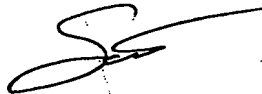
will proceed accordingly. Also, a mixture of these circumstances is possible when multiple inventive concepts exist.

Inventorship is analyzed claim-by-claim. In other words, inventorship may differ from one claim to the next. For a given application, it is necessary to name all persons that invented one or more of the claims presented in the application. Please let me know if you believe, in view of the above explanation, that other inventors might need to be named. Generally, it is easier to add inventors before filing an application.

Inventor Duties:

When executing a patent application, an inventor assumes certain obligations and makes certain important representations. A patent application must be filed in the United States within one year after the first public disclosure or use, or offering for sale of the invention. By signing the Declaration and Power of Attorney for an application, an inventor is representing that this requirement is being met. Also, every inventor who files a patent application has a duty to disclose all prior patents, publications and other information of which he or she is aware that may be material to patentability of the application. The obligation to disclose prior art is a continuing duty throughout the prosecution of the patent application. It is also necessary to disclose in the patent application details of the invention that would enable a person of ordinary skill in the art to make and use the claimed invention without undue experimentation, and to disclose the best version of the invention known to the inventor at the time the patent application is filed. Failure to meet any of the above requirements may have the effect of invalidating any patent that might be obtained on the invention.

Sincerely,



L. Scott Paynter

Enclosures

Cc: Bill Colburn (with enclosures)

022010-000199.LSP.225770

From: Willis S Colburn [wcolburn@ad.uiuc.edu]
Sent: Monday, July 28, 2003 1:43 PM
To: Paynter, Scott; Hyungsoo Choi
Cc: r-vanhoy@uiuc.edu
Subject: RE: patent application

Follow Up Flag: Follow up
Flag Status: Red
Scott,

A teleconference would be fine with me, and my schedule is relatively free at the times you suggested. I understand from Roger that Soo will not be available until Aug 1 at the earliest. It would certainly be reasonable for you to re-estimate the cost of preparing and filing the application with the additional material.

Soo, would you let us know if you would be available for a teleconference on Aug 1 or 2?

Best regards,
Bill

-----Original Message-----

From: Paynter, Scott [mailto:Paynter@uspatent.com]
Sent: Monday, July 28, 2003 11:11 AM
To: Willis S Colburn; Hyungsoo Choi
Subject: RE: patent application

Soo - Thanks for the Cu precursor patent information. Rodger has not been in touch with me yet.

Bill - It seems a teleconference might be appropriate to advance this matter. Unfortunately, my availability is limited in the short term to tomorrow morning (7/29 am), anytime on Friday or Saturday (8/1-8/2), and then not until Tuesday, 8/12. Modifying the application to include the SERS information may be the more cost-effective way to proceed in lieu of a separate application; however, I would like avoid any significant delays to filing if possible. Also, I would like the opportunity to requote if we decide to add the material. Please let me know how you would like to proceed.

Thanks

Scott

Woodard, Emhardt, Moriarty, McNett & Henry LLP
Bank One Tower, suite 3700
111 Monument Circle
Indianapolis, Indiana 46204
1-317-634-3455 x 132 (voice)
1-317-637-7561 (fax)
paynter@USPatent.com (E-mail)

CONFIDENTIAL COMMUNICATION:

The information contained in this message is confidential. It is intended only to be read by the individual or entity named above or their designee. If the reader of this message is not the intended recipient, you are on notice that any distribution of this message, in any form, is strictly prohibited. If you have received this message in error, please immediately notify the sender by telephone at (317) 634-3456 and delete or destroy any copy of this message.

-----Original Message-----

From: Hyungsoo Choi [mailto:hyungsoo@uiuc.edu]
Sent: Wednesday, July 02, 2003 11:19 AM
To: Paynter, Scott
Subject: patent application

Hi Scott,

Thanks for sending me the materials. I received them on last Friday. Roger may have informed you that we would like to talk with you about the application when Bill comes back. I will have some questions and comments on the application then. However, I thought I should give you the info on the patent about the Cu complexes, which I mentioned previously but was slipped somehow. The patent, which is US 6,538,147, claims the Cu complexes and CVD process to deposit Cu thin films using them as precursors.

Recently, my colleagues and I are investigating the properties of the Cu nanowires in an effort to develop bio/chemical sensors using the Surface-Enhanced Raman Scattering (SERS) effect and got a very promising preliminary effect. Wouldn't it be good to add this in the specification?

Soo

CERTIFICATE OF BIRTH

MARION COUNTY HEALTH DEPARTMENT

DIVISION OF HEALTH & HOSPITAL CORP.

3838 NORTH RURAL ST., INDIANAPOLIS, IN 46205

THAT ACCORDING TO THE RECORDS OF THE HEALTH DEPARTMENT

NAME [REDACTED] PAYNTER

WAS BORN IN MARION COUNTY INDIANA, ON SEPTEMBER 22 YEAR 2003

CHILD OF LELAND SCOTT and [REDACTED] PAYNTER

BIRTHPLACE OF FATHER KENTUCKY BIRTHPLACE OF MOTHER INDIANA

RECORD WAS FILED 09/29/2003 CERTIFICATE NUMBER OR VOLUME AND PAGE 015128

DATE ISSUED 06/07/2007

B. JOHNSON CLERK

FC00184470

Virginia A. Carney

M.D.

MARION COUNTY HEALTH OFFICER

MARION COUNTY HEALTH DEPARTMENT

1184470

WARNING: ORIGINAL DOCUMENT HAS A MULTICOLORED BACKGROUND ON SPECIAL WHITE SECURITY PAPER AND THE GREAT SEAL OF THE STATE OF INDIANA ON BACK THAT TURNS FROM ORANGE TO YELLOW WHEN RUBBED. ORIGINAL DOCUMENT HAS HIDDEN VOID ON FRONT THAT APPEARS WHEN PHOTO COPIED.

VOID IF ALTERED OR ERASED

STATE OF INDIANA

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of Technology Management

319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801



September 17, 2003

Scott Paynter
Woodard, Emhardt, Naughton, Moriarty & McNett
Bank One Center/Tower
111 Monument Circle, Suite 3700
Indianapolis, IN 46204-5137

RE: U.S. Patent Application titled
"Nanostructures Including A Metal"
Your Reference No. 22010-199; Our File TF02130

Dear Mr. Paynter:

Enclosed please find the executed Assignments and Declarations for the above file.

Respectfully,

Pamela Davis
Legal Secretary

-Enclosures

RECEIVED
SEP 19 2003
Woodard, Emhardt, Moriarty,
McNett & Henry LLP

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Inventor: Hyungsoo Choi

Application No.: 10/664,431

Filed: September 19, 2003

NANOSTRUCTURES INCLUDING A METAL



)
) Before the Examiner
) Kelly M. Stouffer
)

) Group Art Unit 1762
)
)
)
)

SUPPLEMENTAL DECLARATION UNDER 37 CFR § 1.131

I, the named inventor of the above-indicated patent application (the "Subject Application"), hereby declare as follows:

1. I have reviewed the Subject Application corresponding to the above-indicated Application Number and the currently pending claims (the "Claims") as attached in Exhibit A, and hereby confirm that I am the inventor of the inventions set forth in the Claims. Each of the claims were conceived and reduced to practice by me at the University of Illinois in the United States of America. The Board of Trustees for the University of Illinois (the "University") is the sole owner of the Subject Application and all inventions claimed therein as evidenced by the assignment recorded at reel/frame number 014516/0305.
2. On Wednesday June 25, 2003, I was notified that a draft of the patent application should be arriving soon. I informed the staff member of the University of Illinois – Office of Technology Management (the "OTM Staff") that I received the draft on June 27, 2003 and would forward my comments to the OTM Staff when complete. This is verified in the email chain beginning on June 25 and ending on June 27, 2003 which is attached in Exhibit B.

Inventor Declaration Under 37 CFR 1.131

Inventors: Choi

Application No.: 10/664,431

Filed: September 19, 2003

Page 1 of 3

3. On Monday June 30, 2003, I completed my review of the draft application and forwarded my comments to two members of the OTM Staff. This activity is corroborated by the email dated June 30, 2003, which is attached in Exhibit C.
4. In response to the June 30th email with my comments, I received out of office auto-replies stating that at least one of the OTM staff would be out of the office until at least July 8, 2003. This response is evidenced by two emails dated June 30, 2003 which are attached in Exhibit D.
5. Beginning the second week of July, I began the final preparations for presenting a paper at and attending the Controlled Release Society meeting in Glasgow, Scotland. The travel dates were July 17 through July 31, 2003. This effort is corroborated by the Request for Campus Absence attached in Exhibit E.
6. After my return from Scotland, it was my understanding that the meeting between the OTM Staff, outside counsel, and myself was not scheduled due to outside counsel being unavailable until at least August 12, 2003. This status is corroborated by the emails attached in Exhibit F.
7. During approximately the third week of August, I began preparations due to my employment responsibilities regarding teaching for the upcoming Fall semester which was scheduled to begin on August 27, 2003. This date is verified by the email from the University of Illinois information services which is attached in Exhibit G.
8. A conference call was scheduled for September 9, 2003 to discuss the revised draft of the application. The date and time of the meeting is verified by the email chain from September 8, 2003 which is attached in Exhibit H.

9. A revised draft was sent to me on September 12, 2003 for review and I responded with additional comments on September 12, 2003. Further communication continued through the weekend and ending September 15, 2003. This is verified by the email chain beginning September 12 and ending September 15, 2003 which is attached in Exhibit I.
10. After completion of the final version of the patent application, I was able to sign the Assignment and Declaration which was done on September 16, 2003. This is verified in the email chain beginning September 12 and ending September 16, 2003 which is attached in Exhibit J.
11. Based on information and belief, at this point the components necessary for completing the application were with outside counsel for submission to the USPTO.
12. Based on information and belief, the application was filed on September 19, 2003 as documented by the USPTO.
13. The undersigned, being hereby warned that willful false statements and the like are punishable by a fine or imprisonment, or both (18 USC §1001), and may jeopardize the validity of the application or any patent issuing thereon, declares that all statements made of her own knowledge are true and that all statements made on information and belief are believed to be true.

Date: 9/20/07



Hyungsoo Choi

KD_IM-1019687_1.DOC

CLAIM LISTING

1. (Original) A method, comprising:

performing vapor deposition with an organometallic vapor including copper to form a number of nanostructures on a substrate, the nanostructures each being freestanding during formation and composed of a material including copper; and

wherein said performing provides the nanostructures each with a first dimension of 500 nanometers or less and a second dimension extending to a respective free end of at least ten times the first dimension.

2. (Original) The method of claim 1, wherein the nanostructures are each monocrystalline.

3. (Original) The method of claim 1, wherein the nanostructures are each in the form of nanowires with the second dimension being at least 50 times greater than the first dimension, and the nanostructures essentially consist of copper.

4. (Original) The method of claim 1, wherein the organometallic vapor includes $\text{Cu}(\text{ethylacetoacetate})\text{L}_2$ with L being trialkyl phosphite.

5. (Original) The method of claim 1, which includes enclosing the substrate and the vapor in a chamber and generating the vapor by evaporating a copper-containing precursor.

6. (Currently Amended) The method of claim 5, which includes heating the substrate to no more than about 400 degrees Celsius during said ~~forming~~performing.

7. (Original) The method of claim 5, which includes providing oxygen during the vapor deposition so that the material includes an oxide of copper.

8. (Original) The method of claim 5, wherein the vapor deposition is of a chemical vapor deposition type.

9. (Original) A method, comprising:

depositing a number of monocrystalline nanowires on a substrate from an organometallic substance, the nanowires each being freestanding during deposition and composed of a material including a metal; and

providing the nanowires with a first dimension of 500 nanometers or less after the deposition is completed.

10. (Original) The method of claim 9, which includes incorporating one or more of the nanowires into at least one of an integrated circuit device, a device to process signals having a frequency of 100 GHz or more, a display device, and a sensing device.

11. (Original) The method of claim 9, wherein the metal is copper and the material essentially consists of copper.

12. (Original) The method of claim 9, wherein the organometallic substance includes Cu(ethylacetoacetate)L₂ with L being trialkyl phosphite.

13. (Original) The method of claim 9, wherein said depositing includes performing a chemical vapor deposition with the organometallic substance and heating the substrate during said performing to a temperature of no more than about 400 degrees Celsius.

14. (Original) The method of claim 9, wherein the first dimension of each of the nanowires is 50 nanometers or less.

15. (Original) A method, comprising:

noncatalytically forming a nanowire on a substrate by performing vapor deposition with an organometallic substance;

growing the nanowire during said forming in a direction away from the substrate, the nanowire being freestanding during said growing; and

wherein the nanowire has a first dimension of 500 nanometers or less and a second dimension extending from the substrate to a free end of the nanowire at least 10 times greater than the first dimension.

16. (Original) The method of claim 15, wherein the nanowire is one of a plurality of nanowires made on the substrate during said forming and each of the nanowires has a diameter of 50 nanometers or less.

17. (Original) The method of claim 15, wherein the nanowire is monocrystalline.
18. (Original) The method of claim 15, wherein the nanowire essentially consists of copper or an oxide of copper.
19. (Original) The method of claim 15, wherein the organometallic substance includes $\text{Cu}(\text{ethylacetoacetate})\text{L}_2$ with L being trialkyl phosphite.
20. (Original) The method of claim 15, wherein the vapor deposition is of a chemical vapor deposition type and said forming includes enclosing the substrate in a chamber and heating the substrate to a temperature of 400 degrees Celsius or less during the vapor deposition.
21. (Original) A method, comprising:
- growing a number of monocrystalline nanowires on a substrate from an organometallic substance including copper, the nanowires each being composed of a material including copper; and
 - providing the nanowires with a first dimension of 500 nanometers or less after said growing is completed.
22. (Original) The method of claim 21, which includes incorporating one or more of the nanowires into at least one of an integrated circuit device, a device to process signals with a frequency of 100 GHz or more, a display device, and a sensing device.

23. (Original) The method of claim 21, wherein the organometallic substance includes

$\text{Cu}(\text{R}^1\text{OCOCR}^2\text{COR}^3)\text{L}_x$, wherein:

R^1 is a $\text{C}_1\text{-C}_9$ hydrocarbyl group;

R^2 is H, fluorine F, or a $\text{C}_1\text{-C}_9$ hydrocarbyl group;

R^3 is a $\text{C}_1\text{-C}_9$ hydrocarbyl group or an alkylsilane group of the formula $\{-\text{Si}(\text{R}^4)(\text{R}^5)(\text{R}^6)\}$, in which R^4 , R^5 , and R^6 are each H, F, a $\text{C}_1\text{-C}_9$ hydrocarbyl group, or a $\text{C}_1\text{-C}_9$ alkoxy group of the formula $\{-\text{OR}\}$, in which R is a $\text{C}_1\text{-C}_9$ hydrocarbyl group bonded to silicon (Si);

x is 1, 2, or 3; and

L is a ligand of the formula $\{\text{P}(\text{R}^7)(\text{R}^8)(\text{R}^9)\}$, in which R^7 , R^8 , and R^9 are each a hydroxy group, a $\text{C}_1\text{-C}_9$ hydrocarbyl group, or an alkoxy group of the formula $\{-\text{OR}\}$, in which R is a $\text{C}_1\text{-C}_9$ hydrocarbyl group.

24. (Original) The method of claim 23, which includes performing chemical vapor deposition with the substrate at a temperature of 400 degrees Celsius or less and a pressure of 1.0 torr or less during said growing.

25. (Original) The method of claim 24, wherein said performing includes decomposing a vapor to release at least a portion of the copper included in the copper of the nanowires.

26. (Original) The method of claim 21, wherein the first dimension of each of the nanowires is 50 nanometers or less and the material essentially consists of copper or an oxide of copper.

27. (Original) The method of claim 21, which includes incorporating the nanowires into at least one of an integrated circuit device, a device to process signals having a frequency of 100 GHz or more, a display device, and a sensing device.

Claims 28-40 (Canceled).

From: Pamela Diane Davis [pddavis@ad.uiuc.edu]
Sent: Friday, June 27, 2003 1:57 PM
To: Hyungsoo Choi
Subject: RE: New Patent Application

Follow Up Flag: Follow up
Flag Status: Red
Thanks for the info. I'll let them know.

Pamela Davis
Legal Secretary
Office of Technology Management
319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801
Phone: 217-333-7862
Fax: 217-265-5530

-----Original Message-----

From: Hyungsoo Choi
Sent: Friday, June 27, 2003 1:52 PM
To: Pamela Diane Davis
Subject: RE: New Patent Application

Pamela,

I received the application and documents from Scott. After reviewing them, I will send my comments to Bill and Roger for their review.

Thanks,
Soo

-----Original Message-----

From: Pamela Diane Davis [mailto:pddavis@ad.uiuc.edu]
Sent: Friday, June 27, 2003 10:44 AM
To: Hyungsoo Choi
Subject: RE: New Patent Application

Dear Dr. Choi:

Just a follow-up regarding your receipt of the application and documents sent from Scott Paynter. Did they arrive for your review?

Pamela Davis
Legal Secretary
Office of Technology Management
319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801
Phone: 217-333-7862
Fax: 217-265-5530

-----Original Message-----

From: Hyungsoo Choi
Sent: Wednesday, June 25, 2003 3:48 PM
To: Pamela Diane Davis
Subject: RE: New Patent Application

Dear Pamela,

I have not received the draft application from Scott, yet. However, I will send my comments to Bill Colburn and Roger VanHoy for their review if I have any. It will be good if you could meet me at my office and witness my signature.

Thanks,
Soo

-----Original Message-----

From: Pamela Diane Davis [mailto:pddavis@ad.uiuc.edu]
Sent: Wednesday, June 25, 2003 3:18 PM
To: Hyungsoo Choi
Subject: New Patent Application

Dear Dr. Choi:

You should have, or will soon, receive a draft patent application from Scott Paynter for "Nanostructures Including a Metal". Will you be sending your comments on the application directly to Paynter, as well as the Assignment and the Declaration, or would like to send them to Bill Colburn and Roger VanHoy for their review? If you have difficulty in locating a notary for the Assignment, just send me a note and I'll meet you at your office to witness your signature.

Respectfully,

Pamela Davis
Legal Secretary
Office of Technology Management
319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801
Phone: 217-333-7862
Fax: 217-265-5530

From: Hyungsoo Choi [hyungsoo@uiuc.edu]
Sent: Monday, June 30, 2003 11:18 AM
To: Roger Vanhoy
Cc: Willis S Colburn
Subject: RE: New Patent Application

Follow Up Flag: Follow up
Flag Status: Red
Roger,

As I read the patent application Scott sent me, I have a few questions and comments as below:

1. Would this application be filed in the US only, or in other countries as well? How about file it as a PCT?
2. I have untested ideas about the technology. They are: 1) deposition of other metal layers on the Cu nanowires and 2) growth of nanowires on nanosized seeds on a substrate surface. The seeds could be either metallic or dielectric materials. Can we include these in the embodiment?
3. There are a few application illustrated in the embodiment. Can we add bio/chemical sensors? The Cu nanowires would have very large surface enhanced Raman scattering (SERS) effect.
4. The claims 31 and 37 claim that the nanowires consist essentially of copper. However, that the nanowires are comprised of copper was already claimed in the claims 28 and 35. Claim 32 claims an oxide of copper. Should we use a broader term for copper in the claims 28 and 35?
5. For the process, can we add an example describing a process with additives such as free ligands?
6. As I told you previously, the precursor used here was included in the patent which was issued to me. The patent claimed the Cu complexes and CVD process to deposit copper thin film. Should I give the patent number to Scott?

I will send my comments, the application and documents to you along with after I communicate with you and Bill.

Thanks,
Soo

Out of Office AutoReply New Patent Application_Roger.txt
From: Roger Vanhoy [r-vanhoy@ad.uiuc.edu]
Sent: Monday, June 30, 2003 11:40 AM
To: Hyungsoo Choi
Subject: Out of Office AutoReply: New Patent Application

Follow Up Flag: Follow up
Flag Status: Red

I will be out of the office until Tues. July 1st. If you require immediate attention, please call the OTM main office at (217) 333-7862.

Roger

Out of Office AutoReply New Patent Application.txt
From: Willis S Colburn [wcolburn@ad.uiuc.edu]
Sent: Monday, June 30, 2003 11:40 AM
To: Hyungsoo Choi
Subject: Out of Office AutoReply: New Patent Application

Follow Up Flag: Follow up
Flag Status: Red

I am out of the office until Tuesday July 8th. If you need urgent action, please call (217) 333-7862. Otherwise I will respond to your message on my return.

Thanks,

ECE Request for Campus Absence

Department of Electrical and Computer Engineering

(To be submitted to Room 141 Everitt Laboratory prior to absence)
Request ID = 860

Name: HYUNGSOO CHOI

Network ID: hyungsoo

E-Mail Address: HYUNGSOO@ECE.UIUC.EDU

Indicate category of absence: UNIV TRAVEL

Dates: From 7/17/03 To 7/31/03

Description of Absence/Purpose of Travel:

ATTEND/PRESENT A PAPER AT THE CONTROLLED RELEASE SOCIETY MEETING

Travel Information

Dept. Contact Name: TERRY KIM Phone: 3-3588

Destination: GLASGOW, SCOTLAND

Do you expect to be reimbursed by the University: YES

Total Estimated Cost to University: \$3,000.00

Account(s) to be charged:

1. Acct.#: 1-5-88371

1. Title: KOREAN RES INST YR 5

2. Acct.#:

2. Title:

3. Acct.#:

3. Title:

Cash Advance Required? NO

Amount \$0.00

ATO Requested? NO

Amount \$0.00

Expenses will be reimbursed by other than University: NO

Class Information

I do not plan to meet the following classes:

Course & Section

Day & Time

Arrangements

Signatures

Requester's Signature: _____

Project Director's Signature: _____
(if required)

Departmental Approval: _____

Return to 141 Everitt Laboratory or FAX to 333-7427

From: Willis S Colburn [wcolburn@ad.uiuc.edu]
Sent: Monday, July 28, 2003 1:43 PM
To: Paynter, Scott; Hyungsoo Choi
Cc: r-vanhoy@uiuc.edu
Subject: RE: patent application

Follow Up Flag: Follow up
Flag Status: Red
 Scott,

A teleconference would be fine with me, and my schedule is relatively free at the times you suggested. I understand from Roger that Soo will not be available until Aug 1 at the earliest. It would certainly be reasonable for you to re-estimate the cost of preparing and filing the application with the additional material.

Soo, would you let us know if you would be available for a teleconference on Aug 1 or 2?

Best regards,
 Bill

-----Original Message-----

From: Paynter, Scott [mailto:Paynter@uspatent.com]
Sent: Monday, July 28, 2003 11:11 AM
To: Willis S Colburn; Hyungsoo Choi
Subject: RE: patent application

Soo - Thanks for the Cu precursor patent information. Rodger has not been in touch with me yet.

Bill - It seems a teleconference might be appropriate to advance this matter. Unfortunately, my availability is limited in the short term to tomorrow morning (7/29 am), anytime on Friday or Saturday (8/1-8/2), and then not until Tuesday, 8/12. Modifying the application to include the SERS information may be the more cost-effective way to proceed in lieu of a separate application; however, I would like avoid any significant delays to filing if possible. Also, I would like the opportunity to requote if we decide to add the material. Please let me know how you would like to proceed.

Thanks

Scott

Woodard, Emhardt, Moriarty, McNett & Henry LLP
 Bank One Tower, suite 3700
 111 Monument Circle
 Indianapolis, Indiana 46204
 1-317-634-3455 x 132 (voice)
 1-317-637-7561 (fax)
 paynter@USPatent.com (E-mail)

CONFIDENTIAL COMMUNICATION:

The information contained in this message is confidential. It is intended only to be read by the individual or entity named above or their designee. If the reader of this message is not the intended recipient, you are on notice that any distribution of this message, in any form, is strictly prohibited. If you have received this message in error, please immediately notify the sender by telephone at (317) 634-3456 and delete or destroy any copy of this message.

-----Original Message-----

From: Hyungsoo Choi [mailto:hyungsoo@uiuc.edu]
Sent: Wednesday, July 02, 2003 11:19 AM
To: Paynter, Scott
Subject: patent application

Hi Scott,

Thanks for sending me the materials. I received them on last Friday. Roger may have informed you that we would like to talk with you about the application when Bill comes back. I will have some questions and comments on the application then. However, I thought I should give you the info on the patent about the Cu complexes, which I mentioned previously but was slipped somehow. The patent, which is US 6,538,147, claims the Cu complexes and CVD process to deposit Cu thin films using them as precursors.

Recently, my colleagues and I are investigating the properties of the Cu nanowires in an effort to develop bio/chemical sensors using the Surface-Enhanced Raman Scattering (SERS) effect and got a very promising preliminary effect. Wouldn't it be good to add this in the specification?

Soo

Tasha R. Kelley

From: InfoSource [Infosource@uillinois.edu]

Sent: Monday, June 11, 2007 4:01 PM

To: Tasha R. Kelley

Subject: RE: Archive info

We have three campuses, and each one has a different academic calendar.

I found the Urbana campus 2003-2004 calendar at
<http://www.senate.uiuc.edu/03-04.asp>

Instruction Begins Wednesday, August 27

This day was treated as a Monday; Monday class schedules were followed.

I contacted our Chicago campus with information found at
<http://www.uic.edu/depts/oar/contact/>
They tell me that the first day of classes was August 25.

I contacted our Springfield campus using information found at
<http://www.uis.edu/admissions/>
And was told that classes began August 21.

Please let me know if we can provide additional information.

From: Tasha R. Kelley [mailto:tkelley@kdlegal.com]

Sent: Monday, June 11, 2007 2:29 PM

To: InfoSource

Subject: Archive info

I am looking for the first day of classes for the Fall 2003 semester. Whom should I ask about this type of information?

Thank you,
Tasha Kelley



Tasha R. Kelley
Law Clerk

tkelley@kdlegal.com
www.kriegdevault.com

Krieg DeVault LLP
One Indiana Square
Suite 2800
Indianapolis IN 46204-2079
tel: 317-808-5822
fax: 317-636-1507

Krieg DeVault LLP - Named A "Best Place to Work in Indiana" by the Indiana

6/12/2007

From: Willis S Colburn [wcolburn@ad.uiuc.edu]
Sent: Monday, September 08, 2003 3:21 PM
To: Hyungsoo Choi
Cc: r-vanhoy@uiuc.edu
Subject: RE: Nanowires; TF02130

Follow Up Flag: Follow up
Flag Status: Red
Soo,

I see no advantage of your being at the OTM, so I will link you in by phoning you. I have your phone number as 244-6345; let me know if that is not right or you have another number for me to use.

Our phone system here allows us to set up conference calls with two or three additional parties.

Bill

Willis S. Colburn
Patent Coordinator
Office of Technology Management
University of Illinois
319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801

Phone: 217-265-6217
Fax: 217-265-5530
Email: wcolburn@uiuc.edu

-----Original Message-----

From: Hyungsoo Choi
Sent: Monday, September 08, 2003 3:08 PM
To: Willis S Colburn
Cc: r-vanhoy@uiuc.edu
Subject: RE: Nanowires; TF02130

Bill,

If you prefer me to come to OTM, I will do so. Otherwise, let me know how I could be linked in.

Soo

-----Original Message-----

From: Willis S Colburn [mailto:wcolburn@ad.uiuc.edu]
Sent: Monday, September 08, 2003 2:17 PM
To: Hyungsoo Choi
Cc: r-vanhoy@uiuc.edu
Subject: RE: Nanowires; TF02130

Soo,

We are scheduled for 1:30 pm tomorrow. We will place the call, and you can come here or be linked in from your office.

Bill

-----Original Message-----

From: Hyungsoo Choi
Sent: Monday, September 08, 2003 1:43 PM
To: Willis S Colburn
Cc: r-vanhoy@uiuc.edu
Subject: RE: Nanowires; TF02130

Bill,

Before 10:00 am or between 1:30 – 4:30 pm on Tuesday, September 9 or anytime on Thursday is fine with me.

Soo

-----Original Message-----

From: Willis S Colburn [mailto:wcolburn@ad.uiuc.edu]
Sent: Monday, September 08, 2003 12:39 PM
To: Hyungsoo Choi
Cc: r-vanhoy@uiuc.edu
Subject: Nanowires; TF02130

Soo,

Are you available for a conference call with Scott Paynter in the next day or two?
I'd like to get him going again and have him complete and file the application.
Roger, I assume that you would like to participate in the call.

Best regards,
Bill

RE Patent Application Nanostructures including a metal txt TF02130 (your ref 22010-199).txt

From: Paynter, Scott [Paynter@uspatent.com]

Sent: Monday, September 15, 2003 9:00 AM

To: Hyungsoo Choi

Cc: Willis S Colburn

Subject: RE: Patent Application: Nanostructures including a metal;

TF02130 (your ref: 22010-199)

Follow Up Flag: Follow up

Flag Status: Red

Attachments: 213802_1(WENMM).DOC

Soo:

>From our prior art search, there was very little disclosure of nanostructure growth on dielectrics (silicon dioxide or another type). Thus, there is extra emphasis in certain claims of claim sets 28-34 and 35-38 regarding such features. Indeed, all the inventions of set 35-38 include a substrate with a dielectric surface, and I would rather not change the substance of this set because it was initially drafted with the dielectric surface feature in mind. To take a more even-handed approach with the other set 28-34 (i.e. broadening the "safety net" offered by dependent claims for claim 28), I have added two dependent claims directed specifically to semiconductor and metallic surfaces, respectively. Accordingly, with these additions the claims of set 28-34 has been expanded to claims 28-36, and claims 35-38 have been renumbered as claims 37-40. Please let me know if you have any further changes.

Thanks

Scott

Woodard, Emhardt, Moriarty, McNett & Henry LLP Bank One Tower, suite 3700
111 Monument Circle
Indianapolis, Indiana 46204
1-317-634-3456 (receptionist)
1-317-713-4932 (direct line)
1-317-637-7561 (fax)
paynter@USPatent.com (E-mail)

CONFIDENTIAL COMMUNICATION:

The information contained in this message is confidential. It is intended only to be read by the individual or entity named above or their designee. If the reader of this message is not the intended recipient, you are on notice that any distribution of this message, in any form, is strictly prohibited. If you have received this message in error, please immediately notify the sender by telephone at (317) 634-3456 and delete or destroy any copy of this message.

-----Original Message-----

From: Hyungsoo Choi [mailto:hyungsoo@uiuc.edu]

Sent: Saturday, September 13, 2003 9:30 AM

To: Paynter, Scott

Cc: 'Willis S Colburn'

Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your ref: 22010-199)

Scott,

Thanks for your prompt action.

As read the application again, I have another question regarding the claims. In claim 30 (which is a dependent claim of claim 28), silicon dioxide is claimed as a

2024

RE Patent Application Nanostructures including a metal txt TF02130 (your ref 22010-199).txt
substrate. In claim 35 (independent claim), dielectric substrate is claimed and silicon dioxide is again claimed in claim 36. It seems that you made a special emphasis on silicon dioxide substrate. Is it because you see the silicon dioxide substrate would have more important applications? If not, did you mean the silicon dioxide in claim 30 to be silicon? Since the growth of nanowires on silicon (semiconductor) as well as metals is expected to be as important as that on silicon dioxide (dielectric), if not more important, we may want to include each of them as dependent claim of 28, at least, and modify claims 35 and 36 accordingly.

What do you think?

Thanks,

Soo

-----Original Message-----

From: Paynter, Scott [mailto:Paynter@uspatent.com]

Sent: Friday, September 12, 2003 5:58 PM

To: Hyungsoo Choi

Cc: Willis S Colburn

Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your ref: 22010-199)

Soo:

Thanks for your comments. Attached is a further revised draft with changes to pages 7 and 11 to address comment 1. The changes in comments 2 and 3 were also made. As to comment 4, I have modified the fifth experiment description in a manner that should not require a change to claim 32 and made corresponding adjustments to the description of stage 140 on page 11. Please let me know if you have any further comments.

Thanks

Scott

Woodard, Emhardt, Moriarty, McNett & Henry LLP Bank One Tower, suite 3700
111 Monument Circle
Indianapolis, Indiana 46204
1-317-634-3456 (receptionist)
1-317-713-4932 (direct line)
1-317-637-7561 (fax)
paynter@USPatent.com (E-mail)

CONFIDENTIAL COMMUNICATION:

The information contained in this message is confidential. It is intended only to be read by the individual or entity named above or their designee. If the reader of this message is not the intended recipient, you are on notice that any distribution of this message, in any form, is strictly prohibited. If you have received this message in error, please immediately notify the sender by telephone at (317) 634-3456 and delete or destroy any copy of this message.

-----Original Message-----

From: Hyungsoo Choi [mailto:hyungsoo@uiuc.edu]

Sent: Friday, September 12, 2003 4:10 PM

To: Paynter, Scott

Cc: 'Willis S Colburn'

Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your ref: 22010-199)

Scott,

304

RE Patent Application Nanostructures including a metal txt TF02130 (your ref 22010-199).txt

Thanks for sending me the documents via email and fax. Instead of making changes/questions using the "track change" tool, I listed them in the below:

1. L6, 9, and 10 of page 7 indicates the use of oxygen. Instead of specifically mentioning it to be oxygen, can we use a broader term such as input for other sources or gases?
2. A typo in L23, p12: noncatalytic.
3. L11, P15: The experiment on brass substrate was actually carried out at 300C. If it is not important to change 250C to 300C, it may leave it as it is.
4. For the fifth experiment in p17, For the initiation of the nanowire growth, I found that oxygen was excluded at least at the initial step. Should we still maintain the example or modify it? Depending on what we do with this, we may need to modify claim 32 in p24.

Please let me know your opinion on them.

Thanks,
Soo

-----Original Message-----

From: Paynter, Scott [mailto:Paynter@uspatent.com]

Sent: Friday, September 12, 2003 2:28 PM

To: Hyungsoo Choi

Cc: Willis S Colburn

Subject: Patent Application: Nanostructures including a metal; TF02130 (your ref: 22010-199)

Soo:

Attached is the revised draft of the application. The figures are unchanged, but will be faxed to you separately to make sure your copy is complete. Note that the revisions occur on pages 7-9, 12-13, 15, and 24-26. The revisions address matters raised during our telephone conversations and comments from Bill Colburn's review. If further changes should be made, please make them using the "track changes" tool or some other method that permits ready identification of changes made. Also attached is an Inventor's Declaration/Power of Attorney and an Assignment. Once the application is approved, Bill will print-out the papers and attend to your execution of them.

Thanks

Scott

Woodard, Emhardt, Moriarty, McNett & Henry LLP Bank One Tower, suite 3700
111 Monument Circle
Indianapolis, Indiana 46204
1-317-634-3456 (receptionist)
1-317-713-4932 (direct line)
1-317-637-7561 (fax)
paynter@USPatent.com (E-mail)

CONFIDENTIAL COMMUNICATION:

The information contained in this message is confidential. It is intended only to be read by the individual or entity named above or their designee. If the reader of this message is not the intended recipient, you are on notice that any distribution of this message, in any form, is strictly prohibited. If you have received this message in error, please immediately notify the sender by telephone at (317)

404

RE Patent Application Nanostructures including a metal txt TF02130 (your ref 22010-199).txt
634-3456 and delete or destroy any copy of this message.

RE Patent Application Nanostructures including a metal.txt
From: Pamela Diane Davis [pddavis@ad.uiuc.edu]
Sent: Tuesday, September 16, 2003 3:21 PM
To: Hyungsoo Choi
Subject: RE: Patent Application: Nanostructures including a metal;
TF02130 (your ref: 22010-199)

Follow Up Flag: Follow up
Flag Status: Red

Great. I'm on my way

-----Original Message-----

From: Hyungsoo Choi
Sent: Tuesday, September 16, 2003 3:18 PM
To: Pamela Diane Davis
Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your
ref: 22010-199)

I am at 101 Optical Physics and Engineering Building located at 607 E.
Healey which is around the corner of Jerusalem Restaurant across the Everitt lab on
Wright street.

-----Original Message-----

From: Pamela Diane Davis [mailto:pddavis@ad.uiuc.edu]
Sent: Tuesday, September 16, 2003 3:14 PM
To: Hyungsoo Choi
Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your
ref: 22010-199)

Sure, where are you located?

-----Original Message-----

From: Hyungsoo Choi
Sent: Tuesday, September 16, 2003 3:05 PM
To: Pamela Diane Davis
Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your
ref: 22010-199)

Dear Pamela,

Could you come and help me with the notarization? I will be in my office this
afternoon.

Thanks,

Soo

-----Original Message-----

From: Pamela Diane Davis [mailto:pddavis@ad.uiuc.edu]
Sent: Friday, September 12, 2003 4:48 PM
To: Hyungsoo Choi
Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your
ref: 22010-199)

Great. Just give me an hour or so notice to meet with you at your office.

-----Original Message-----

From: Hyungsoo Choi
Sent: Friday, September 12, 2003 4:47 PM
To: Pamela Diane Davis
Subject: RE: Patent Application: Nanostructures including a metal; TF02130 (your
ref: 22010-199)

242

RE Patent Application Nanostructures including a metal.txt

Pamela,

I have the hard copy of the Assignment and the Declaration for Patent Application I received in June. For notarization, I would appreciate your help very much. I will let you know when we are ready to proceed with it.

Thanks,

Soo

-----Original Message-----

From: Pamela Diane Davis [mailto:pddavis@ad.uiuc.edu]

Sent: Friday, September 12, 2003 3:16 PM

To: Hyungsoo Choi

Subject: FW: Patent Application: Nanostructures including a metal; TF02130 (your ref: 22010-199)

Dear Dr. Choi:

Attached are the application for TF02130 (I assume Scott Paynter also sent you the application) along with the Assignment and the Declaration for Utility Patent Application. I sent you a hard copy of the Assignment and the Declaration the end of June. If you have misplaced those copies, please print these out, sign and date both documents, and return them to me via campus mail at the address below (the Assignment must be notarized; if you do not have a notary available to, I would be more than happy to meet you at your office and witness your signature).

If you have any questions, please don't hesitate to call.

Respectfully,

Pamela Davis
Legal Secretary
Office of Technology Management
319 Ceramics Building, MC-243
105 South Goodwin Avenue
Urbana, IL 61801
Phone 217-333-7862
Fax 217-265-5530